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Evaluation of Abdominal Closure Technique in Emergency Laparotomies at a Tertiary Care Hospital in Jharkhand

Dr.Dibakar Hansda[1], Dr.Lakshman Hansda[2*]
[1]*Professor, Department of Surgery, MGM Medical College, Jamshedpur.*
[2]*Assistant Professor, Department of Surgery, MGM Medical College, Jamshedpur.*
Corresponding Author: Dr.Dibakar Hansda

Abstract: *Abdominal wound closure technique should be efficient to perform, provide strength and be a barrier to infection. The method of closure of the abdominal wall is a critical aspect of an effective incision closure, in addition to the choice of suture material. The aim of the study was to report our experience with abdominal wound closure technique in peripheral hospital. A prospective, cohort study (February 2014-July 2016) conducted in MGM Medical College, Jamshedpur. It included patients who underwent laparotomy. All abdominal wall wounds were closed by standardized documented method of closure; mass closure using one loop continuous suture with delayed absorbable polygactin 910 (Vicryl). Data regarding postoperative complications was collected and managed statistically by SPSS computer program. The study included 300 patients; the indication for laparotomy was inflammatory, traumatic and neoplastic in 61.6%, 33% and 4.4% respectively. It was performed through vertical and transverse incisions in 231 (77.2%) and 69 (22.8%) respectively. Mean postoperative hospital stay was 9.1 ±3.6 days (Range 3- 30 days), and was affected by the postoperative course. Postoperative complications seen in 40.8% and it was affected by indication for surgery, p=0.01. The complications encountered were wound infection, sepsis, chest infection, DVT, wound dehiscence and incisional hernia in 29.6%, 6.8%, 3.4%, 1%, 0.5%, and 0.5% respectively. In conclusion, wound infections after abdominal surgery are still frequent types of nosocomial infections. Mass abdominal closure with continuous Vicryl suture and size modified to age and body built decreases postoperative complication.*

Keywords: *Laparotomy; Mass closure technique (MCT); Polygactin 910 (Vicryl); Complications*

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I. Introduction

Exploratory laparotomy whether elective or emergency has always remained one of the common operations across the surgical disciplines. The closure of such a laparotomy wound is key to reduce the post-operative morbidity like wound pain, wound infections and incisional hernias.[1] Wound dehiscence carries with it a substantial morbidity and mortality. Mortality associated with burst abdomen has been estimated at 16%. [2] The mean time for wound dehiscence is 8-10 days after operation. [2,3] Abdominal wound dehiscence is a common complication of emergency laparotomies in Indian setup. Wound dehiscence is related to technique of closure of abdomen. Many patients in India have poor nutritional status and the presentation of patients with peritonitis is often delayed. This makes the problem of wound dehiscence more common in Indian setup.[4] Post-operative complete wound dehiscence is a very serious complication associated with high morbidity and mortality.[5] The optimal strategy of abdominal wall closure after midline laparotomy has remained an issue of ongoing debate. To date, various randomised clinical trials and meta-analysis have been published with heterogeneous results. While the choice may not be so important in elective patients who are nutritionally adequate, do not have any risk factors for dehiscence and are well prepared for surgery, however it may prove crucial in emergency patients who often have multiple risk factors for developing dehiscence. 6 The aim of this study was to determine the local wound complication in terms of wound dehiscence using modified midline abdominal wound closure technique in emergency laparotomies for extensive generalised peritonitis.

II. Materials and Methods

This is a retrospective non-randomised study of 300 cases which were treated as surgical emergencies during the period from (February 2014-July 2016) conducted in MGM Medical College, Jamshedpur.

Inclusion criteria:

- All patients who had undergone midline laparotomy for emergency indications which included patients with extensive generalised peritonitis.

Exclusion criteria:

- Cases with minimal peritoneal contamination(less than 50 ml)
- Patients who had undergone previous laparotomy for any condition.
- Patients younger than 18 years of age.
- Patients who required re-exploration in postoperative course.

All patients were initially seen in the casualty and later referred to emergency surgical room (ESR) for further evaluation. A detailed history and clinical examination was done by senior surgical resident and consultant. The data was noted on a proforma. Baseline investigations like complete blood count, serum creatinine, BUN, serum electrolytes, chest X-ray, electrocardiograph and random blood sugar were noted in all the cases. Abdominal Xrays, ultrasonography and CT scans of abdomen and pelvis were also done in a few cases. All the patients had an acute presentation and required immediate intervention. Initially resuscitation was carried out with intravenous fluids (Ringer's lactate) along with Foley's catheterisation and nasogastric tube insertion. All the patients were assessed by one anaesthetist, written and informed consent was taken after counselling regarding the condition of the patient and the possible outcomes. Under general anaesthesia operative field was prepared with povidone iodine scrub (10%) and all the patients were opened through vertical midline incision. The surgical procedure was conducted according to the need of underlying disease. After dealing with primary pathology thorough peritoneal lavage was given with normal saline. Two 32 F UMA-ADK tube drains were placed in the peritoneal cavity and were brought out through separate stab incisions. The drains were kept in Rutherford-Morrison's pouch and pelvis from right and left sides respectively. A modified repair of the midline abdominal wound was performed in all the cases. Technique After completion of intraperitoneal procedure, a space was created between anterior rectus sheath and subcutaneous fat on either side so as to facilitate direct visualisation of anterior rectus sheath during the closure of abdominal wound (Figure 1). The space was created laterally for a distance of 2.5 cm from the cut edge of linea Alba. The care was taken not to damage the perforating vessels (Figure 2), care was also taken not to cut umbilical tube.

After approximation of linea Alba, a Romson's 100% silicone- Jackson Pratt type close wound drainage system was placed in the sub-cutaneous space between anterior rectus sheath and sub-cutaneous fat which was created at the beginning of abdominal wall closure This drain was brought out through separate stab incision away from main wound on skin. The sub-cutaneous tissue was closed with 2-0 polyglycolic acid violet (Vicryl). Skin was closed with either skin staplers or 2-0 monofilament polyamide suture (Ethilon). All the patients were given pre-operatively antibiotics half an hour prior to surgery based on weight and the creatinine clearance of the patients. The antibiotic course was extended (cephalosporin and metronidazole) after the surgery. The midline laparotomy wound was managed by dressing only in cases of wound soakage otherwise wound check was done only after 72 hrs.

STATISTICAL ANALYSIS: Data was entered in SPSS version 24.0 and statistical analysis was done. Mean was calculated for descriptive variables like age, sex while frequency was determined for different diagnoses of cases undergoing emergency laparotomies along with wound dehiscence.

III. Results

A total of 300 cases which were treated as surgical emergencies during the period from (February 2014-July 2016) conducted in MGM Medical College, Jamshedpur.

Aetiology	Diagnosis	Frequency	Percentage
Inflammatory (N=220)	Intestinal obstruction	165	75%
	Perforated viscus	35	25%
Traumatic (N=70)	Stab viscus	40	57%
	Gun shot	8	11.42%
	Blunt abdominal trauma	12	17.14%
	RTA	10	14.28%
Neoplastic (N=10)	Abdominal mass	5	1.4%
	Ectopic pregnancy	3	1%
	Ovarian cyst	2	1.2%

Table 1: Preoperative diagnosis (N=300)

The age of patients at presentation ranged from 18-86 yrs. With a median age of 45.55 yrs. Majority of the study participants were in the age group of 31-45 years. constituting 44.44 %. Next commonest age group was between 46-60 years at 26.20%.

Incisions		Number	Percentage
Vertical (N=246)	Midline	176	71.54
	Paramedian	70	28.45
Transverse (N=54)	Upper	52	96.29
	Lower	2	3.703
Total		300	100

Table 2: Laparotomy incision (N=300)

	Frequency (Percentage)	
Small bowel	91(43.5)	Injury 67 (32.6)
		Intussusceptions 15(7.3)
		Perforated DU 6(3.2)
		Internal hernia 4(2.7)
		Adhesive obstruction 24(10.7)
Large bowel	65(30.76)	Injury 45(22.6)
		Sigmoid vulvulous 10(10)
		Intussusception 10(12)
Appendix	30(20.6)	Inflamed 1(0.8)
		Perforated 29 (14.75)
Liver Injury	20(9.7)	
Spleenic injury	15(7.2)	
Diaphragmatic injury	8(3.8)	
Bladder injury	6(3.2)	
Ectopic pregnancy	5(1.9)	
Uterine Injury	4(1.7)	
Ovarian cyst	4(2.7)	Lt ovarian cyst 2(2)
		Ruptured Rt ovarian cyst 2(2)
Pancreatitis	3(1.7)	Hemorrhagic 2(1)
		Acute 1(0.5)
Lung injury	1(0.5)	
Mickl's Diverticulum	1(0.5)	
Perforated GB	1(0.5)	
Lymphangioma	1(0.5)	

Table 3: Intraopeartive findings

Indication		Wound infection	Sepsis	Chest infection	DVT	Burst abdomen	Incision hernia	Total
Inflammatory	Perforated viscous	21(11.6%)	3(1.8%)	3(1.6%)	1(0.5%)	1(0.5%)	1(0.5%)	29(16.5)
	Intestinal obstruction	18(8.9%)	1(0.6%)	3(1.6%)	-	-	-	22(11.1)
	Total	39(20.5%)	5(2.4%)	6(2.6%)	1(0.5%)	1(0.5%)	1(0.5%)	53(27)
Traumatic	Stab wound	17(8.5%)	3(1.7%)	1(0.5%)	1(0.5%)	-	-	22(11.2)
	Gunshot	05 (2.3%)	5(2.1%)	-	-	-		10(4.4%)
	Blunt Trauma	02(0.6%)	-	-	-	-	-	02(0.6%)
	Total	24(11.4%)	8(3.8%)	1(0.5%)	-	1(0.5%)	1(0.5%)	35(16.7)
Total		126(63.8)	25(12.4)	14(3.726)	1(0.5%)	1(0.5%)	1(0.5%)	173(65%)

Table 4: Complications encountered after laparotomy (n=300)

The exploratory laparotomies were performed for a variety of conditions including inflammatory, traumatic, neoplastic, vascular pathologies etc. (Table 4). The main complication encountered in these patients was found to be local wound sepsis.

IV. Discussion

In our practice we adopted the suture length to wound length ratio of 4:1, this practice is supported by prospective experimental and clinical studies [9-12]. We tailored the suture size for each patient depends on patient's age and body built. Most of the studies in the current surgical literature employ a number 0 or larger size suture to close the fascia. It should be noted, however one study found no greater incidence of wound dehiscence, compared with studies in which surgeons use heavier gauge sutures, when they used size 2-0 suture material to close the fascia. The double-loop closure method provides the most tensile strength, but in one study, it was associated with a significantly increased rate of pulmonary complications and postoperative death,

possibly related to decreased compliance of the abdominal wall. The suture thickness chosen must provide adequate tensile strength as well as adequate elasticity to accommodate an increase in intra-abdominal pressure in the postoperative period [3]. Our adoption of mass closure is supported by 2 meta-analyses [13,14].

V. Conclusion

Wound infections after abdominal surgery are still frequent nosocomial infections. Our modified technique used in managing the patients with generalised peritonitis and perforated malignancies (complicated/high risk laparotomies) is associated with a low incidence of serious complications like wound sepsis and wound dehiscence.

- Acute wound dehiscence can be reduced in emergency laparotomy using our method of abdominal wound closure.
- Use of suction drain in sub-cutaneous space reduces incidence of local wound sepsis.
- Intraperitoneal sepsis is important factor in predicting burst.

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